BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

abandonment of this application, then such extensions of time are hereby petitioned under 37 C.F.R. § 1.136(a), and any fees required therefor (including fees for net addition of claims) are hereby authorized to be charged to our Deposit Account No. 19-0036.

Amendments

In the Title:

Kindly change the title from "Ball Grid Array Package Substrates and Method for Making the Same" to --Ball Grid Array Package Substrates with a Modified Central Opening and Method for Making the Same--.

In the Claims:

Please substitute the following claim 1, 2, 8-10, 13-15, 18, 19, 22, and 25 for the pending claim 1, 2, 8-10, 13-15, 18, 19, 22, and 25:

1. (Amended) A substrate in an integrated circuit (IC) package, comprising:

opposing first and second surfaces, wherein one of said first and said second surfaces has a plurality of solder ball contacts pads formed thereon, wherein said first surface has a central opening,

wherein said central opening has an edge,

wherein said edge includes at least one protruding edge portion that extends into said central opening,

whereby said at least one protruding edge portion provides a shorter distance between a trace on said first surface and an IC die relative to a distance between the trace and the IC die when said at least one protruding edge portion is not present.

A' cont'd

2. (Amended) The substrate of claim 1, wherein the substrate is capable of being coupled to a surface of a stiffener that has a central bondable ring, wherein said at least one protruding edge portion is configured to extend across a portion of the central bondable ring when the substrate is coupled to the stiffener surface.

8. (Amended) A substrate in an integrated circuit (IC) package, comprising:

opposing first and second surfaces, wherein one of said first and said second surfaces has a plurality of solder ball contacts pads formed thereon, wherein said first surface has a central opening,

A2

wherein said central opening has an edge,

wherein said edge includes at least one recessed edge portion,

whereby said at least one recessed edge portion provides access to a portion of a surface of a stiffener attached to the substrate relative to when the at least one recessed edge portion is not present.

9. (Amended) The substrate of claim 8, wherein the substrate is capable of being coupled to a surface of a stiffener that has a central bondable ring, wherein said at least one recessed edge portion is configured to expose a portion of the central bondable ring when the substrate is coupled to the stiffener surface.

A2 cont'd

10. (Amended) The substrate of claim 9, wherein said at least one recessed edge portion is configured to allow a corresponding bond wire to couple an IC die mounted on said surface of said stiffener to said central bondable ring.

13. (Amended) A substrate in an integrated circuit (IC) package, comprising:

opposing first and second surfaces, wherein one of said first and said second surfaces has a plurality of solder ball contacts pads formed thereon, wherein said first surface has a central opening,

A3

wherein said central opening has an edge,

wherein said first surface includes at least one hole proximate to said edge,

whereby said at least one hole proximate to said edge provides access to a portion of a surface of a stiffener attached to the substrate relative to when the at least one hole proximate to said edge is not present.

14. (Amended) The substrate of claim 13, wherein the substrate is capable of being coupled to a surface of a stiffener that has a central bondable ring, wherein said

at least one hole is configured to expose a portion of the central bondable ring when the substrate is coupled to the stiffener surface.

A3 cont'd

15. (Amended) The substrate of claim 14, wherein said at least one hole is configured to allow a corresponding bond wire to couple an IC die mounted on said surface of said stiffener to the exposed portion of the central bondable ring.

18. (Amended) A substrate in an integrated circuit (IC) package, comprising:

opposing first and second surfaces, wherein one of said first and said second surfaces has a plurality of solder ball contacts pads formed thereon, wherein said first surface of the substrate has a central opening, wherein said central opening has an edge;

A4

a first trace on said first surface of the substrate proximate to a first portion of said edge;

a second trace on said first surface of the substrate proximate to a second portion of said edge;

wherein the substrate is capable of being coupled to a surface of a stiffener that has a central bondable ring, wherein said first portion of said edge is configured to cover a first portion of the central bondable ring when the substrate is coupled to the surface of the stiffener, and said second portion of said edge is configured to expose a second portion of the central bondable ring when the substrate is coupled to the surface of the stiffener;

whereby said first portion of said edge allows for a shorter distance between said first trace and an IC die relative a distance between said second trace and the IC die.

A4 cont'd

19. (Amended) The substrate of claim 18, wherein said second portion of said edge is configured to allow a wire to couple an IC die to the second portion of the central bondable ring.

22. (Amended) An integrated circuit (IC) package, comprising:

a substrate that has opposing first and second surfaces, wherein one of said first and said second surfaces has a plurality of solder ball contact pads formed thereon, wherein said first surface has a central opening;

a stiffener that has a first surface, wherein said first surface of said stiffener has a central bondable ring, wherein said first surface of said stiffener is attached to said substrate;

A5

wherein said central opening has an edge, wherein said edge includes at least one of:

(a) a protruding edge portion that extends across at least a portion of said central ground ring,

(b) a recessed edge portion that exposes a portion of said central ground ring, or

(c) a hole proximate to said edge, wherein the hole exposes a portion of said central ground ring.

25. (Amended) The IC package of claim 22, wherein said first surface of said stiffener has a central cavity that coincides with said central opening of said substrate, wherein said central bondable ring surrounds said central cavity.

A6

Please add the following claims:

31. (New) The substrate of claim 2, wherein the central bondable ring is a ground ring or a power ring.

32. (New) The substrate of claim 9, wherein the central bondable ring is a ground ring or a power ring.

33. (New) The substrate of claim 14, wherein the central bondable ring is a ground ring or a power ring.

A7

34. (New) The substrate of claim 18, wherein the central bondable ring is a ground ring or a power ring.

35. (New) The IC package of claim 22, wherein said central bondable ring is a ground ring or a power ring.

36. (New) An integrated circuit (IC) package, comprising:

a stiffener that has a first surface, wherein said first surface of said stiffener has a central bondable ring;

an IC die mounted to said first surface of said stiffener within said central bondable ring; and

a substrate that has opposing first and second surfaces, wherein said first surface of said substrate has a plurality of solder ball contact pads formed thereon, wherein said first surface of said stiffener is attached to said second surface of said substrate, wherein said substrate has a central opening that is open at said first and said second surfaces of said substrate, wherein the central opening accommodates said IC die;

wherein said central opening has an edge, wherein said edge has a protruding edge portion that extends across a portion of said central bondable ring, wherein a trace on said first surface of said substrate extends into said protruding edge portion;

whereby said protruding edge portion provides a shorter distance between said trace and said IC die relative a distance between said trace and said IC die when said protruding edge portion is not present.

37. (New) The IC package of claim 36, further comprising:

a bond wire that couples a pin of said IC die to said trace.

38. (New) The IC package of claim 36, further comprising:

a bond wire that couples a pin of said IC die to said central bondable ring.

39. (New) An integrated circuit (IC) package, comprising:

a stiffener that has a first surface, wherein said first surface of said stiffener has a central bondable ring;

an IC die mounted to said first surface of said stiffener within said central bondable ring;

a substrate that has opposing first and second surfaces, wherein said first surface of said substrate has a plurality of solder ball contact pads formed thereon, wherein said first surface of said stiffener is attached to said second surface of said substrate, wherein said substrate has a central opening that is open at said first and said second surfaces of said substrate, wherein said central opening accommodates said IC die; and

wherein said central opening has an edge, wherein said edge has a recessed edge portion that exposes a portion of said central bondable ring;

whereby said recessed edge portion provides access to a portion of said central bondable ring that would not be accessible when the recessed edge portion is not present.

40. (New) The IC package of claim 39, further comprising:

a bond wire that couples a pin of said IC die to a trace on said first surface of said substrate proximate to said edge.

41. (New) The IC package of claim 39, further comprising:

a bond wire that couples a pin of said IC die to said portion of central bondable ring exposed by said recessed edge portion.

42. (New) An integrated circuit (IC) package, comprising:

a stiffener that has a first surface, wherein said first surface of said stiffener has a central bondable ring;

an IC die mounted to said first surface of said stiffener within said central bondable ring; and

a substrate that has opposing first and second surfaces, wherein said first surface of said substrate has a plurality of solder ball contact pads formed thereon, wherein said first surface of said stiffener is attached to said second surface of said substrate, wherein said substrate has a central opening that is open at said first surface and said second surface of said substrate, wherein said central opening accommodates said IC die, wherein said first surface of said substrate has a hole proximate to an edge of said central opening;

wherein said hole exposes a portion of said central bondable ring;

whereby said hole provides access to said portion of said central bondable ring that would not be accessible when said hole is not present.

43. (New) The IC package of claim 42, further comprising:

a bond wire that couples a pin of said IC die to a trace on said first surface of said substrate proximate to said edge.

44. (New) The IC package of claim 42, further comprising:

a bond wire that couples a pin of said IC die to said portion of central bondable ring through said hole.

45. (New) The substrate of claim 2, wherein said plurality of solder ball contact pads are on said first surface of the substrate.

46. (New) The substrate of claim 2, wherein said plurality of solder ball contact pads are on said second surface of the substrate.

47. (New) The substrate of claim 9, wherein said plurality of solder ball contact pads are on said first surface of the substrate.

48. (New) The substrate of claim 9, wherein said plurality of solder ball contact pads are on said second surface of the substrate.

49. (New) The substrate of claim 14, wherein said plurality of solder ball contact pads are on said first surface of the substrate.

50. (New) The substrate of claim 14, wherein said plurality of solder ball contact pads are on said second surface of the substrate.

51. (New) The substrate of claim 18, wherein said plurality of solder ball contact pads are on said first surface of the substrate.

52. (New) The substrate of claim 18, wherein said plurality of solder ball contact pads are on said second surface of the substrate.

A7 cont'd

53. (New) The substrate of claim 22, wherein said plurality of solder ball contact pads are on said first surface of the substrate.

54. (New) The substrate of claim 22, wherein said plurality of solder ball contact pads are on said second surface of the substrate.